HANDBOOK
OF
MILITARY WING

(A guide to Armed Forces Military Wing
Entry Examination with Solved Papers
up-to-date including Test Papers)

BY

M R DUGGAL
Editor-in-Chief "Careers"

Price Rs 4/8

CAREERS
53, Esplanade Road.
DELHI—6

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Wing Entry Examination containing
Questions and Answers in accor-
dance with the syllabus of
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PREFACE

The need for such a guide was very keenly felt The book has been compiled after careful study of the Union Public Service Commission's syllabus of Armed Forces Military Wing Examination and the papers set in examinations already held

From the long association with these competitive examinations the author can safely say that he has discovered the candidates real need and he thinks that those who read this Handbook will also bear him out, and will profit very much from it and save themselves from the clutches of a number of coaches who rob the anxious but innocent candidates.

The author has tried to steer clear of *non essentials* and only essentials have been included. This may be judged by comparing the material in the *Handbook* with actual questions set in the above examination. In fact it is based on the close study of the syllabus issued and papers set

Besides the latest papers have been solved Each subject has been dealt in a separate chapter in the test series each main topic has been dealt separately giving adequate hints and suggestions etc The author feels sure that the *Handbook* would prove as useful as other of his books always have proved

In the end he gratefully acknowledges the liberal use of books of English, Algebra, Trigonometry, U P S C papers etc.

The author shall feel obliged for suggestions for improvement of the book.

45, Block Nil   M R Duggal
Malviyanagar
New Delhi

NATIONAL DEFENCE ACADEMY

Admission Rules

A combined examination for admission to the Militar Wing of the National Defence Academy and the Initi Training Wing of the Indian Air Force is held by the Unior Public Service Comission twice every year—one in J uary or February and the second in June, or July.

Copies of application form can be had from the Secre tary Public Service Commission, Dholpur House, Post Box No. 86 NewDelhi.

The application must reach the Secretary Union Public Service Commission before the due date jalong with the necessary documents of minimum qualification, a certificate of age and a treasury receipt or postal certificate of Rs. 37/u (Rs. 9/6 in case of candidates belonging to the schedule castse) as the examination fee.

The candidate must not be less than 17 and more than 20 years of age in the year he has to join the Academy. In case of the personnel serving in the Army the age limit is relaxed to 24 years.

Candidate should be medically fit in all respects to service in any part of the world.

Candidate must undertake not to merry untill he com pletes his full training.

Candidate must have passed the Intermediate or equi valent Examination of a recognised Indian University.

Candidates who obtain qualifying marks at the written examination shall have to appear before a Services Selec tion Board which will make recommendations for the final selection.

While the cost of training including books, uniform, rding etc. will be borne by the Government the candi will be expected to meet his pocket expenses.

andidates finally selected by Services Selection Board rmy will undergo a course of training up to 2 years

at the Military Wing of the National Defence Academy. Civilian candidates will be enrolled under the Indian Army Act as 'gentlemen cadets'

Subjects for the Examination

1. English		300
2 General Knowledge and Current Affairs		300
3 Mathematics I		150
4 Mathematics II		150

The standard of the paper, will be approximately the same as that for the Intermediate Examination

English

(1) *Essay Writing* . Choice of three or four subjects may be given

(2) *Precis Writing* A passage of 300 to 350 words may be given

(3) *Letter Writing* Narration, Description and Dialogue writing

(4) Questions on synonyms, antonyms, idiomatic use of words and phrases and common errors

(5) Parts of Speech , simple analysis , syntax and direct and indirect speech.

General Knowledge

A variety of questions of the type given in our H B of General Knowledge and H B of Present Day Knowledge or Current Affairs is set Candidate is advised to possess these two publications of the CAREERS along with its latest supplement to CAREERS A reference to papers of previous examinations will reveal nat CARCERS' publications on the subject are the best guide

Mathematics I

Arithmetic Candidates should be familiar with the syllabus of the Matriculation Examination of any Indian University

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Unitary method ; vulgar and decimal fractions and the extraction of square roots ; proportion and proportional parts ; averages, percentages, simple and compound interests ; profit and loss ; stocks and shares ; elementary mensuration ; simple formulas for determining volumes and areas of rectangular blocks, circular cylinder and the sphere etc.

Mathematics II

Algebra : Elementary algebraic operations ; formulae expressing arithmetic generalisation , factors, fractions, equations and the use of fractional and negative indices and the elementary theory of logarithms. The use of Remainder Theorems ratio and proportion, Graphs and their simple applications.

Geometry : The paper in Geometry will contain questions on Practical and Theoretical Geometry.

The questions on Theoretical Geometry will consist of theorems contained in any Matriculation Geometry and the questions on Practical Geometry as prescribed for the Matriculation Examination.

Elementary Trigonometry : (Question in this subject shall be optional). Questions in Trigonometry will consist of (1) measurement of angles ; (2) Trigonometrical ratios for angles less than a right angle ; (3) Trigonometrical ratios of angles of any size and sign and (4) Application of the Trigonometrical ratios in solving simple practical problems.

N.B. In order to qualify in the written examination, candidates must obtain 50 per cent. of the aggragate marks.

CONTENTS

ENGLISH

Q 1 Write an essay of not more than 400 words on one of the following subjects —

(a) Some desirable improvements in your home town

(b) An account of a cinema or a drama you have been to

(c) Domestic pets

(d) Relate some unusual or specially interesting event which has happened to you

(e) The character of your favourite hero in history or fiction—with reasons for your choice   120

Ans (1) Some Desirable Improvement in Your Town

The place of one's permanent residence has always got pecular fascination to the person for the whole of his life This is a type of fascination which does not wear off with the laps of time or the change of circumstances

After partition life with its useful demands took us from the place of our birth the place to which we originally belonged to this distant place Delhi and at last to one of the suburbs near Qutab newly built for us the displaced persons from West Pakistan We were forced by circumstances to leave out hearths and homes and settle in this place known as Malvianagar named after the grand old man of India Pandit Madan Mohan Malviya

When we arrived here in this refugee township we found some disorderly houses built by P W D in a haphazard way with dusty roads and bye lanes add heaps of rubbish lying about here and there infested with lizzards and snakes etc We had to struggle hard and agitate for the removal of rubbish and have the bye lanes and enclosures levelled into lawns and parks More water pumps have been installed roads have been built and metalled, and a township with streets, parks and bye lanes hes come into being

But despite all that change of situation, difference of life and a new outlook towards things which age, experience and new contacts have brought on us, there is something which urges from within to say that this is the place where now we have to live and spend the rest of our life and this thought gives us a strange satisfaction and strengthens our attachment to the township all the more. The vicissitudes of life through which we have passed in the wake of partition after the care-free life that we led in the country of our birth, makes us some times sad, but one thing is quite definite and stands out beyond doubt that it attaches us all the more to every brick of the township. The more we are taken back into the immaturity of childhood, little mischiefs and irresponsibilities, the more we feel attached to the present state and the township and we feel inclined to get it improved and get it turned into an ideal place worth living for and to forget all the hidden places where we played the truant and other incidents that come back to our mind's eye with full force.

The attitude of the people here, however, is the main thing which one finds so disgusting. People here know you and deal with you, respect you or hate you, be friendly with you or inimical on account of what position you hold, how much money you have, what office you command and all that. But the relationship of the people of our native village sprang from entirely different sources. The attitude of the majority was determined by the way in which they looked at us in our childhood. Their relations were governed more by what we were and what we had been rather than what we could do.

This is the charm and this is the fascination which memory, past associations and the eye of imagination lends to the atmosphere of our native village and that is the sole excuse for the human heart to ache at the thought of the visit. But as all that, coupled with the associations of our child life, has been cut off for ever and there is no hope at all of visiting the land of our birth the sooner we forget those reminences the better. And the attachment to our new environments is bound to play a healing balm to our

ld wounds of forsaking the land of our birth The more we
labour to beautify our environments the more attachment we
will have with it

So after getting the rubble removed and parks and
streets levelled we continued our efforts at being provided
with more amenities for our township Now that electric
poles have been fixed and pipes for the supply of drinking
water have been laid we hope to get electric power and pure
water supply in the near future These developments and
desirable improvements in the township are bound to make
us forget our past and live in pleasant present

(b) An Account of a Cinema

Cinema is one of the most powerful factors in the social
life of the peoples of our time It has had influence in
three way—as an amusement educational and by way of
creating a closer touch by making the lives of different
people of different lands known to each other The cinema
has made the world on the whole better known

As a source of amusement it has been a very great
success A labourer who toils in the factory for eight to
ten hours a day the bank clerk who pours over figures for
long hours all feel tired at the end of days labour and need
some relaxation a type of relaxation in which they may lose
themselves by completely forgetting the worries of the day
the fatigue of the present and worries of to-morrow etc

Describe a show that you witnessed in the company of
your friends after a day s hard job

(c) Domestic Pets

There are several domestic pets, but dog is the most
common Since the advent of British Raj, people have
adopted dog following the habit of their masters, as their
favourite pet Dogs are otherwise very useful too And
there are several anecdotes which relate the fidelity of dogs
They have laid down their lives in the service of their
masters Of all the animals dog is said to be the most loyal
and its fidelity is proverbial

It is told of a dog that his master fell from a precipice
while going on a journey followed by his dog The decent

was steep and the traveller could not rise up and he fell down dead. The dog followed his master down the precipice and kept watch over his corpse and did not leave it till the dog too died of starvation.

Children grow very fond of the pups and become fond of feeding them out of their own hands. They love to play with the pup. The dog also begins to respond to the children caresses and sometimes the natural friendship between the children and the dog which develops from childhood ends into a life-long friendship. The children are generally mischievous and take pleasure in teasing it by pulling at his tail but the dog becomes so frolicksome that it is never provoked to bite ois friends.

The dogs can also be trained as useful servants for driving carts and sledges and keeping watch during night. Some are trained to help their master in hunting wild animals and tending their flocks. An equal amount of pleasure is derived while training them as hunting dogs. And so on.

(d) An Unusual Event

The twentieth of March was a Holi holiday and to avoid being drenched in a bath of colour we had arranged for an outing to the Qutab and we had asked two of our friends to join us in this excussion.

We met outside Delhi Gate which was fixed as the starting point of the road leading to Qutab. We had to wait for one of our friends who had not arrived till ten and the ravellers in colours and Holi dance were gathering in Darya Ganj so we grew anxious lest the ravellers in Holi dance may not spot us. We were getting worried about our friend when one of us pointed him in the distance smeared in colour. It made us feel that he had come in a real Holi spirit.

All of us merrily started towards the Qutab. We were going at a good pace, chatting and laughing and enjoying our ganderies which we had bought, when we suddenly saw a bus coming towards us at a very rash speed. We at once jumped off our bicycles dragging them along with us. The lorry suddenly passed by us, had turned turtle and struck

against a tree with a crash. And it was not many seconds before we heard the shrieks of passengers injured and ble... We ran to their rescue and the police arrived on the scen... A large crowd of people gathered and the lorry driver arrested Some of the passengers were in agony and the... were removed to the hospital We were asked to the policemen to the police station to get the ... recorded

The rest of the day was spent in the court yard of th... Tughlak Road Thana and when we got free, our spirits ... too damped to continue the excursion Both the end the time for excursion having gone we returned home v... much exhausted both in mind and body.

(*) Favourite Hero in History

Sivaji

Sivaji was born in 1627 His father, Shahji was a ... ber of the Bhonsle Clan He had a jagir from the Bij... Court His mother Jiji Bai was an intensely de... Hindu lady who did much to stimulate the zeal of her son in defence of Hinduism Ramdas, reputed to be the per... ceptor of Sivaji, added to that zeal

Sivaji has grown to be a legendry figure Round him are gathered numerous legends, stories and traditio... Many Indian found in him a successor of Rama trying to es... tablish Ram Rajya again on the soil of India He had a... become a symbol of resurgent Indian nationalism fighting against the tyranny of a foreign power To the Hindus he was a hero, a man of extraordinary genius

While still a boy he began his operations in a small way as a robber chief He gathered round him the sturdy folk of the hills called the Mawalis Fort after fort fell to him He conquered Kenkan and this made the Bijapore authorities alert. In 1659 an imposing army under Afzal Khan was sent against Sivaji Sivaji met him in a parley and in a hand to hand fight and killed him

This made Aurangzeb thoughtful and he sent another army under Sayishtakhan and later Prince Muzzam and Raja Jai Singh. The latter pursuaded Sivaji to surrender and

he went to Agra under the protection of Jai Singh. But he was not received well. So he escaped and returned to his country after many adventures. At last Raja Jaswant Singh pursuaded Aurangzeb to grant him the tittle of Raja in 1667.

No such hero was ever born, nor will there be any in days to come as Sivaji was. His hold on his followers rested on his intense devotion to the cause of Hinduism, as also on his skill in warfare and on his capacity for organisation.

He was not a robber chief bent on loot but pious. He was a man with a vision, the vision being the establishment of *Ram Rajya*. Discipline was strictly enforced among his follower. No one in the army was to take with him wife, mistress or prostituted, one who infringed this rule was to loose his heads. He organised his army, the administration of his kingdom alby, on the revenue system etc. with the hand of a genius.

Q. 2. Make a precis of the following passage in about one-third of its original length. Give a short title to your precis.

'Never was there a person more destitute than Girard of the qualities which win the affections of others. His temper was violent, his presence forbidding, his usual manner ungracious, his will inflexible, his heart untender, his imagination dead. He was hateful to his fellow-citizens, who considered him the hardest and meanest of men. He had lived among them for half a century, but he was more a Philadelphian in 1830 than in 1776. Surrounded with Christian churches, which he had helped to build, he remained a sturdy unbeliever. He made it a point of duty to labour on Sunday, as a good example to others. He made no secret of the fact that he considered the idleness of Sunday an injury, moral and economical. He would have opened his bank on Sundays if anyone would have come For his part, he required no rest, and would have He never travelled. He never attended public families, or amusements. He had no affections to gratify friends to visit, no curiosity to appease, no tastes

to indulge. What he once said of himself ... to be true, that he rose in the morning with but a sing object and that was to labour so hard all day as to be to sleep at night. The world was absolutely nothing him but a working place. He scorned and scouted opinion that old men should cease to labour, and sho spend the evening of their lives in tranquillity. 'No,' would say, labour is the price of life, its happiness, everything. To rest is to rust. Every man should labour the last hour of his ability. Such was Stephen Girar the richest man who ever lived in Philadelphia.

This is an unpleasing picture of a citizen of polite and amiable Philadelphia. It were, indeed, a grim and dre world in which should prevail the principles of Girard see what this man has done for the city that loved him Vast and imposing structures rise in its outskirts, wherein at this hour, six hundred poor orphan boys are fed, clothed trained and taught, upon the income of the enormous estate which he won by this entire concentration of sating property. In the ample grounds of Girard Colleg looking up at its five massive buildings, strolling in its shac walks, or by its green grassy playgrounds, or listening to the cheerful cries of the boys at play, the most sympathetic and imaginative of men must pause before censuring unlovely life of its founder. (About 420 words)

Stephen Gerald

Ans. Stephen Gerald the richest man of Philadelphia, was very insatiable and barren. He was violent in and inflexible, harsh and unkind in manners. He appeared hateful, mean and hard to the core and a staunch unbeliever but very hardworking and did not spare himself even on Sundays, for he believed that idleness was moral and economic injury. He required no rest for himself, for he thought "rest" is "rust".

He was, therefore, unsocial, friendless, affectionless and uninquisitive to the utmost. His sole purpose in life was to work hard in order to get sound sleep at night. He considered labour as the price of life and its happiness

But he did a lot for the city that loved him not. He built a grand building to house 600 poor orphans, a college to educate them and play grounds for their recreation.

Q. 3. Compose an imaginary dialogue (of not more then 20 sentences) between the following persons :— 80

Either,

(a) A motorist and a predestrain who has just been knocked down.

Or,

(b) The owner and a boy who has been caught trespassing in the owner's fruit garden. 40

Dialogue between a Motorist and a Pedestrian

Ans. *Pedestrian*   Driver ! why are you so careless ?

Motorist: I am sorry sir, but why don't you take to the foot path meant for you.

Pedestrian: I was just going to cross the road to be on the other side, you ought not to be so rash.

Mostorist: Sir ! You ought to have let the motor pass.

Pedestrian . I waited a lorry passed and when you were quite at a distance I tried to cross the road.

Motorist: Sir ! You ought to have taken into account the distance and the speed.

Pedestrian: But why didn't your horn ?

Motorist: Sir ! You came so suddenly before the car that there was no time to warn you by horn

Pedestrian: You ought not to have been so rash and applied the brakes.

Motorist: I did apply the brakes Sir, or you would have been run over.

Motorist: Let me see how severe is the injury ?

Pedestrian: There is a severe pain in the left leg.

Motorist: After examining the injury. It is bleeding.

Pedestrian: Take me to some doctor for first aid.

Q. 4. Construct separate sentences to bring out the meaning of the following pairs of words. (Total ten sentences.)

    (a) Much and Many.

    (b) Lose and Loose.

    (c) Persecute and Prosecute.

    (d) Quiet and Quite.

    (e) Canvas and canvass.   30

Ans. (a) *Much* : Please do not be so rude. This is too *much* for me to bear.

Many : I had *many* books on the subject from the different authors and *many* more I had to buy still.

(b) *Lose* . I had to *lose* my job because of the differences with my boss.

Loose : The knot was loose and the bundle slipped from my hands.

(c) *Persecute* : The Police uses third degree methods and *persecute* the alleged criminals to extract evidence.

Prosecute : The thief was *prosecuted* and produced before the magistrate to be got remanded to custody.

(d) *Quiet* : It was dead of night and there was all *quiet.*

Quite : He was *quite* hale and hearty now and not sickly as before.

(e) *Canvas* : Now a days I wear a *canvas* shoe as it is very comfortable.

Canvass : I had to canvass him to agree to my proposal as it was the only way left to us.

Q. 5. Correct and rewrite the following sentences :—

    (a) Many houses were blown off during the storm.

    (b) Two 'Hannibal, aircrafts will arrive tomorrow.

    (c) None of the complainants were present this morning.

    (d) He was a first member to be the member of the Parliament.

(e) There now seems little hope of him being selected
for further tests   10

Ans (a)   The roofs of many houses were blown off
the storm

(b)   Two Hannibal aircraft will be flown here tomor
row

(c)   None of the complainants was present this

(d)   He was the first to be a member of the Parliament

(e)   There seems to be little hope now of his being se
lected for further tests

Q 6   Use the following five words in short senten
(a) as nouns   (b) as adjectives   (Total ten sentences)

     Steel   Garden   River   Brick   Book

Ans   *Steel*   is manufactured at Jamshedpur in India
The *steel* frame of this picture is rusty now

The Mughal *gardens* were open to public in the month
of December this year

The *garden* wall has been washed away recently owing
heavy floods

The Ganga *river* is the sacred *river* of India

During this rainy season a part of the *river* parapet
washed away

A *brick* has been removed from this wall by some m
creant It must be replaced

Brick kilns are very far off from this colony

These *books* are too heavy to be carried by one person

The *book* packet is under stamped

M. W. July 1953

GENERAL KNOWLEDGE

Time allowed—2½ hours   *Maximum Marks—300.*

Candidates should attempt **six questions** *from each part as directed at the beginning of each part.*

Part A

Q. 1. Write brief notes on the following :—

(a) The exchange of prisoners of the Korean War.

(b) The agreement between Britain and Egypt on the question of Sudan.

(c) India's stand in the U.N.O. on the question of Kashmere.

Ans. (a) War in Korea was a long drawn out affair and both sides feeling the pinch concluded a rational and honourable truce. But the prospects of peace were sabotaged by Dr. Rhee, who released 25,000 North Korean Ps.O.W. Both the Commands, however, overcame the shock and a six-point armistice agreement was reached on 26th July, 1953.

Under the Agreement a N.N.R.C. consisting of Sweden, Switzerland, Poland and Czechoslovakia under the chairmanship of India who was to provide the Custodian Force for supervising the transfer of Ps.O.W. was appointed

A complete stalemate prevailed in the work of explanations and after 90 days of disputes and wrangles, the remaining unrepatriated North Korean Ps O W were returned to U.N. Command.

(b) Britain agreed to approve self-government for Sudan only on the understanding that Britain and Egypt should maintain final authority. And on February 12 1953 an Agreement giving self-government to Sudan was signed. It provides that after three years Sudan will choose whether she wants independence or some form of link with Egypt. During the transition period the Foreign Affairs and Defence will be under the direction of Governor-General, Sir Robert Howe.

(c). India's stand in the U.N.O. on the question of Kashmere is based on the following principles :—(i) Kashmere's accession to India is sovereign, (ii) but because the accession had been accepted under the shadow of invasion. India is prepared to accept the verdict of plebiscite on the question of accession of Kashmere, provided Pakistan with draws her forces from Kashmere and creates an atmosphere for a fair plebiscite on the issue of affiliation.

Q. 2. What do you know of the following ? Write briefly.

(a) Sheikh Mohammed Abdullah . (b) Stalin, (c) The Salvation Army ; (d) The Five-Year Plan of the Government of India.

(a) Sheikh Mohammed Abdullah was born in 1905, was educated at Aligarh, became the leader of National Conference, the first political Party in Kashmere, was popularly known as "Shere-i-Kashmir" Later became the Prime Minister of Kashmir, when the thought of 'Independent Kashmere" dinned into his ears by Foreigners turned his head and he refused to listen to reason and ratify Indo-Kashmir Agreement reached between the two Governments. The National Conference deposed him from leadership and Sardar-i-Riyast had to depose him from Prime Ministership and then to imprison him for security reasons as he intended to fly away from Kashmere.

(b) Stalin was born in 1879. He was an active revolutionary from early age and took active part in the Civil War after 1917. After the death of Lenin he became an outstanding figure in Russia. In 1929 he introduced Russia's first Five-Year Plan and was the General Secretary of the Central Executive Committee of the U.S.S.R from 1924-42. Became Defence Commissioner from July 1941 and assumed the Supreme Command of the Red Army. He was the Prime Minister of U.S.S.R. and Marshal of the Soviet Union from 1943. He died on 6th March 1953, after an attack of paralysis.

(c) Salvation Army :—was founded by William Booth, the methodist Minister in 1835 under the name of East

London Mission. In 1878 it became quasi-military Organisation under the name of *Salvation Army* with Mr. Booth as its first General and Commander-in-Chief. The object was the promotion of practical religion among the masses. It now preaches the same Gospel in 104 languages and publishes 129 periodicals with a total weekly circulation of more than 1,500,000. Its operations extend to 97 countries and colonies. It has thousands of Corps and Outposts, social Institutions, Day Schools, Naval and Military Homes.

(d) **The First Five-Year Plan** : was presented to the Parliament on December 8, 1952. The Draft Outline consists of two parts, the first envisages an expenditure of Rs. 1,493 crores and the second of Rs. 300 crores to be taken only if external assistance became available. In the final Report, however, the various programmes have been brought together into a single Plan. All the development projects have been included in the Final Plan.

The initial objective of the Plan is to raise the living standards of the people, to intimate a process of development to open out to the people new oppertunities for a richer and more varied life. The Plan, therefore, aims at utilizing more effectively the available human and material resources to secure a large output of goods and services, while at the same time reducing the inequalities of income and wealth.

Q. 3 (a) Name the Commander-in-Chief of the Army in India.

(b) Name the Commander-in-Chief of the Indian Air Force.

(c) Name the Commander-in-Chief of the Indian Navy.

(d) How many sheets of paper are there in one quire ?

(e) How many sheets of paper are there in one ream ?

(f) What is the length of a tennis court ?

(g) What is the breadth of a tennis court ?

(h) What is the length of a cricket pitch ?

(i) What is the distance between the ground and the centre top of a badminton net ?

(j) What is the Indian rupee equal to in English money?

(k) Name the recent winner of the Stalin Peace Prize?

(l) What is the approximate value of the Stalin Peace Prize

(m) Who is the Governor of the Punjab (India)?

(n) What is the U S A dollar equal to in Indian money?

(o) Who is the author of As You Like it?

(p) Who is the author of Three Musketeers?

(q) Name Miss for 1952

(r) Name the Chief Minister of Madras

(s) Name the Prime Minister of U S S R

(t) Name the Governor of West Bengal

Ans (a) Gen Rajinder Singhji (b) Air Vice Marshal G E Gibbs (c) Rear Admiral C T M Pizey (d) 2s sheets (e) 500 sheets (f) 78 feet (g) 36 feet (h) 22 yds from pitch to pitch (i) 5 feet in the centre (j) 18 d (k) Dr Kitchlew (l) Rs 4 12 annas (m) Sri C P N Singh (n) Rs 4 12 9 (o) Shakespeare (p) Alexander Dumas (q) (r) Sri C Rajagopalachariya (s) M Georges Melankov (t) H C Mukerjee

Q 4 What positions are held by the following?

(a) Mr Dulles (b) Professor Ahmed Bokhari (c) Sri Rajeshwar Dayal (d) Shri Banerjee (e) Dr Radha-Krishnan I (f) Mr Anthony Eden (g) M Molotov (h) Marshal Tito (i) Malik Feroz Khan Noon

Ans (a) Secretary of State for U S A

(b) Pakistan s permanent representative in U N O

(c) India s permanent representative in U N O

(d) Chairman Union Public Service Commission

(e) Vice President Government of India

(f) Britain s Secretary of State for Foreign Affairs

(g) Foreign Minister U.S.S.R.

(h) President Yugoslavia.

(i) Chief Minister West Punjab (Pakistan).

Q 5. What do the following abbreviations stand for ?—
(a) A.C. (in electricity) ; (b) D. C. (in electricity) ; (c) V.C. (in Universities) . (d) V C (in the British Army) ; (e) P.P. (in Indian Courts of Justice) ; (f) Adj. (in the Army) ; (g) O.C. (in the army ; (h) I.A.C. (in the Army) ; (i) P E.P.S.U. (j) Viz.

Ans. (a) Alternate current ; (b) Direct current ; (c) Vice Chancellor , (d) Victoria Cross (r) Public Prosecutor ; (f) Adjutant ; (g) Officer Commanding ; (h) Indian Army Corps ; (i) Patiala and East Punjab States Union ; (j) Namely.

Q. 6. (a) Give the name of the Indian who has won the Nobel Prize for his contribution to scientific knowledge.

(b) Give the name of an Indian who has won the Nobel Prize for his contribution to literature.

(c) Give the name of an Indian F.R.S.

(d) Give the name of the latest ex.queen of Egypt.

(e) Give the name of three outstanding poets in Indian languages.

(f) Give the name of the biggest multi-purpose project under construction in the Punjab (India).

(g) Give the names of the two biggest cement manufacturing concerns in India.

Ans. (a) Dr. Raman ; (b) Dr. Rabindra Nath Tagore ; (c) Dr. H. J. Bhaba : (d) Queen Marriman , (e) Tulsi Das (Hindi), Rabindra Nath Tagore (Bengali) and Parameswarn Pillai (Tamil) ; (f) Bhakra and Nangal project ; (g) Portland Cement Co. and Dalmia Cement Manufacturing Co.

Q. 7. Name the ranks of the Indian Commissioned Officers (formerly known as King's Commissioned officers) in the Land Forces in ascending order of seniority.

Ans Lieutenant Captain Major Liet Colonel Colonel Colonel Brigadier Maj General Liet General General and Field Marshal

Q 8 (a) State the approximate number of soldiers in —
(i) a platoon (ii) a company (iii) a battalion (iv) a brigade and (v) a division

(b) (i) What is the Indian equivalent of the Military Cross ?

(ii) What is the Indian equivalent of the Distinguished Service Order ?

(iii) Name the Indian State which is under the rule of the President in these days

(iv) Name the new State which the Government of India has decided to create shortly

(v) Name three of the Chief Ministers of Part B States

Ans (a) (i) 40 (ii) 120 (iii) 600 (iv) 120 (v) 3600
(b) (i) All the part C & D States are Ajmer Bhopal Coorg D lhi Himachal Pradesh Vindhya Pradesh Bilaspur Kutch Manipur Tripura Andaman & Nicobar (ii) Andhra
(v) Assam Sri Bishnuram Mehdi Bihar Sri S K Sinha Bombay Sri Morarji Desai

Part B

Q 9 Explain the difference between —
(a) White and black (b) Power and energy (c) Solar and lunar eclipses (d) a solution and a suspension (e) weather climate (f) cast iron & steel (g) anti septic and prophylactic (h) mammal and reptile

Ans (a) Sunlight is composed of seven colours and white is a blend of all the seven If an object reflects all the rays without absorbing any the object apears white if however the object absorbs all the rays of l ght and does not reflect any it appears black

(b) Power is the ability to do or act prossess ion of particular faculty of body or mind or authorization or dele gated authority through governments influence to act

Energy : is inherent force or vigour and individual powers potential, static or latent in exercise; a bodys powers of doing work by virtue of its motion and stress resulting from it.

(c) **Solar Eclips** : is a shadow of the moon falling on the earth when the sun, the moon and the earth are in the same straight line on the new moon-day.

Lunar Eclips is a shadow of the earth falling on the moon on some full moon-day when all the three, the sun, the earth and the moon are in the same straight line.

(d) **Solution** is a homogenous mixture of a solute in the solvent, a liquid. When the solute is completely dissolved in the solvent and not a single particle remains undissolved.

Suspension . when a solid remains suspended in the liquid and it does not dissolve it is called a suspension.

(e) **Weather** . is the condition of atmosphere at a place and at a particular time produced by heat or cold, clearness or cloudiness, dryness or moisture, wind or calm, high or low pressure.

Climate : is the sum total of the result of weather conditions of a place observed for several years and result obtained after observations for some years.

(f) **Cast iron** is the metal extracted after smelting from different ores of the metal. It contains a fairly large quantity of carbon in it from 1.5 to 3.5 percent. It can be cast into moulds and is used in the manufacture of moulds, pipes etc. is also known as pig iron.

Steel . is the variety of iron which is much in general use and contains carbon from, 5 to 1 5 percent It is prepared by "Bessemer process" It is used in the manufacture of tools, rails and other important articles

(g) **Antisepatic** : is a medicine which destorys or weakens the action of microbes, bacteria or germs and arrests the spread of diseases caused by them — caroulic acid, mercury per choloride etc.

Prophylactic · is a medicin · literate tending to prevent diseases

(h) **Mammals** are quadrupeds which rear their offsprings by suckling them on milk. Their females prossess mammary galands for suckling their youngs

Reptiles A class of animals which crawl such as snakes, lizards, turtles etc

Q 10 What do you understand by the following ?—

(a) Inertia (b) British Thermal Unit (c) Astigmatism (d) Destructive distillation (e) Fixation of nitrogen, (f) Deli quescent (g) Chlorophyll (h) Inoculation (i) Abdomen , (j) Calorific value

Ans (a) Every body in nature remains at rest or moves with a uniform velocity unless compelled by force to act otherwise This is called the law of Inertia

(b) It is the quantity of heat required to raise the temprature of one pound of water through 1°F

(c) It is due to difference in the curvature of the vertical and the horizontal sections of the interior of the eye ball with the result that the objects can be seen in one plane and not in the other This defect is called astigmatism

(d) It is the process of heating coal or wood out of contact with air In it the volatile products distil over which condense to coal tar and coal gas thus formed is collected and used for heating and lighting purposes

(e) 'Nitrogen forms one of the essential contituents of proteins which are almost absolutely necessary for the maintenance of vegetable and animal lives So plants and animals, require nitrogenous food. The electric discharges convert aerial Nitrogen into compounds of nitrogen which are washed down by rain and from the food of plants These plants on decay decompose it to ammonia and other gases and nitrogen is restored to the air

(f) **Deliquescent** are those substances which absorb moisture from the air and become liquid in it

(g) **Chlorophyll** is the green pigment or colouring matter found in the green plants

(h) **Inoculation** is the process of impregnating the blood with disease germs as a protective measure

(*i*) It is the belly or part of the body which lie between the chest and contains the pelvis and the stomach, the intestines, the liver, the pancreas and the kidneys.

(*j*) It is the quantity of heat in calories produced by any article of food when consumed in body.

Q. 11 (*a*) What is the cause of rainbow ?

(*b*) Why don't we fly off by the spinning earth ?

(*c*) What do you mean by fixing a photographic plate ?

(*d*) Why does not your skin burst when you become fat ?

(*e*) Which is the most abundant element in earth's crust ?

Ans. (*a*) When the rays of the sun falling slantingly on rain droplets hanging in the air are dispersed by them, rainbow is formed on the horizon opposite to the sun.

(*b*) The gravity of the earth is so strong that it keeps us pinned to the earth's surface, so we do not fly off. This would have been the case if there would have been no action of gravity.

(*c*) First the object is focussed on the ground glass screen placed on the hinder part of the camera. Then this screen is replaced by a photographic plate, this is called fixing a photographic plate

(*d*) Because the skin also grows with other parts of body and as we grow muscles and other parts of body, the skin also grows with them.

(*e*) Iron which is 39·7 percent in the earths crust

Q. 12. (*a*) What is a lodestone ·

(*b*) Give chemical names of :—

(*i*) caustic soda ; (*ii*) Alum (*iii*) Washing soda ; (*iv*) Plaster of paris ; and (*v*) Glaubers salt

(*c*) How does your blood help body fight disease ?

(*d*) What is a leap year ·

Ans (*a*) It is a tetra oxide of iron (Fe_3O_4), was first in Magnesia in Asia Minor It attracts iron and other

magnetic substances, in fact it behaves like a magnet and is called the *natural magnet*

(b) (i) Sodium Hydroxide (ii) Double sulphate of sodium and Aluminium, (iii) Sodium carbonate, (iv) Magnesium sulphate (anhydrons), (v) Crystalline sulphate of Magnesium

(c) There are two kinds of corpuscles in the blood in the blood plasma, a white fluid—red and white A variety of corpuscles act as soldiers of the body and fight disease germs or bacteria by forming puss at the sores

(d) It was fixed by Julius Caeser in 45 B C , the addition of one day in every four years bringing the measure of the calendar years even with astronomical year, with three minutes per year over, this again is levelled up by dropping leap year on every century viz 100, 200 300 etc, but 400, 800, 1200 and 1600 are leap year to level it up.

Q 13 (a) How do you distinguish —

(i) Nitrogen gas from carbon dioxide gas ? (ii) potassium carbonate from potassium hydroxide ?

(b) What do you know of the following ?

(i) Kirkee (ii) Ichapore, (iii) Katni, (iv) Ambernath

(c) What are — (i) Saliva ? (ii) bile ?

(d) Where in India are the following found ?

(i) Lion , (ii) Rhinoceros, (iii) Mica , (iv) Sandal wood

(e) Where has a material body no weight

Ans (a) (i) Both are non supporter of life and combustion, but it is carboo dioxide which turns lime water milky, while nitrogen does not

(ii) Both are highly deliquescent solids, extremely soluble in water imparting to it a soapy feel But caustic potash absorbs CO_2 and turns yellow turmeric brown

(b) It is near Poona and is noted for its arsenal and meteriological observatory

(ii)

(iii) It is Cement manufacturing centre

(iv)

(c) (i) It is a secretion produced in the mouth by salivary glands present in the mouth. It is alkaline in its action and converts starch into sugar.

(ii) It is a secretion produced in the liver. It is a yellow fluid capable of emulsifying fat.

(a) (i) Lion is found in Gujrat Kathiawar jungles

(ii) In the swamps of Assam and Sunderbans.

(iii) In Mysore.

(e) It has no weight at the centre of the earth or in the interstellar space where the force of gravity is zero.

Q. 14. (a) Why do soldiers break steps when crossing a bridge ?

(b) What makes you feel the beat of the pulse ?

(c) When are days and night longest in a year ?

(d) How would you identify the following solutions ?

(i) Lime water ; (ii) Commonsalt in water.

(e) What happens if you bore a hole through an electric bulb and then switch on current ?

Ans : (a) If they continue marching in steps the ridge will snap across by the swing given by the regular steps.

(b) The blood courses through the arteries, the muscular action of the rings of muscels in the wall of arteries and it is this expansion and contraction felt when a finger is placed at an artery.

(c) The days are the longest when the sun shines vertically on the tropic of Cancer and the nights are the longest when the sun is vertically above the tropic of capricorn in the northern hemispher and vice versa in the southern hemisphere.

(d) (i) By blowing through it it turns milky it is lime water.

(ii) By tasting it and then by evaporating a bit of the solution on a watch glass when salt is left on the watch.

The filament of the bulb will be oxidized to ash and

Q 15   What are the following persons famous for ?

(a) (i) Birbal Sahni (ii) Isaac Newton (iii) James
Watt (iv) Guglielmo Marconi (v) Alexandar Graham
Bell

(b) Where are the following situated and for what
special reason ?

(i) National Metallurgical Laboratory (ii) Glass and
Ceramic Research Institute (iii) Fuel Research Institute
(iv) Leather Research Institute (v) Sindri Fertilizer
Factory

(c) Why does water boil when put on lime ?

(d) An electric lamp used on a 220 volt line draws a
current of 1 ampere Find the cost of operating this lamp
100 hours if the charge for electric power is 4 annas per
unit i e Kilowatt hour

Ans (a) (i) Prominent Punjabi scientist Represented
India at the International Congress at Amsterdam

(ii) Prominent scientist who discovered the force of
gravity and gave the Laws of motion

(iii) He invented the locomotive engine

(iv) Italian scientist inventor of Wireless was awar
ded Nobel prize for Physis

(v) Eminent scientist who invented telephone and
photophone

(b) (i) At Jamshedpur because it is here that Tata Iron
and Steel Works are situated and therefore the research
work in metallurgy can best be taken over here

(ii) At Jadhavpur for research carried out can be
applied in the glass factory near by

(iii) Dhanbad for the coal mine near by he used for
the application of research carried out in the laboratory

(iv) at Madras for here hides and skins can be found

(v) at Sindri where cheap electricity can be had from
D V C and gypsum is found in its vicinity

(c) Because it combines chemically with lime farming slaked or hydroxide of lime and vigorous heat is generated in the chemical action.

(d) $\dfrac{220 \times 1}{100} = 22$ unit per hour

$22 \times 100 = 22$ units for 100 hours.

$\therefore$ Cost $= \dfrac{22}{4} =$ Rs. 5—8.

Q. 16. (a) What is a midnight sun ?

(b) During which period of the year does India receive most rain and why ?

(c) Why does yeast make bread rise ?

(d) What are the different types of volcano ?

(e) How do bees hum ?

Ans. (a) The north pole or places near it remain before the sun almost 24 hours when the sun is vertically over the Tropic of Cancer. So the sun is visible also at dead of right and it is called the midnight sun

(b) : During the summer due to the Monsoons, which blow from the Arabian Sea across India till these strike Western Ghats: Vindhyas and the Himalayas.

(c) : Because Yeast set up fermentation in it giving off Carbon dioxide which raises the bread during its escape.

(d) : There are three types of volcano—the active, the dormant and the extinct The active volcanoes are those which are throwing out gases and lava through their crator. The dormant are those which are not active but are liable to resume their activity after sometimes, while extinct are those which have spent up their energy altogether.

(e) : Hum is produced due to viberation of their wings while flying.

Q. 17 : (a) What are the characteristic of tribal economy as found among the Naga tribes ?

(b) How do germs cause disease ?

(c) What are the functions of the kidney ?

(d) Why do you not feel any pain when cutting your finger nails ?

(c) Simplify :—

$$\frac{(0.75)^2(1\frac{1}{2}+\frac{2}{3})(\frac{5}{6}-1.5)}{\sqrt{2.25}(2\frac{3}{4}-1\frac{1}{3})}$$

Solution : (a) Ratio of I. G. to H. S. currency

$$=100 : \frac{350}{3}$$

Officers income according to I. G. $=\frac{100\times3}{350}\times425=\frac{2550}{7}$

$$=364\frac{2}{7} \text{ I. G.}$$

(b) Ratio of kilocy. to metres$=1420 : 211.3$

∴ When kilocy. are 970, metres$=\frac{211.3\times970}{1420}=\frac{204961}{142}$

$$=144.34$$

∴ When metres are 49.5 the kilocy.

are $=\frac{1420\times49.5}{211.3}=\frac{702900}{2113}=332.65$

(c) Exp.$=\frac{\frac{3^2}{4}(\frac{3}{2}+\frac{2}{3})(\frac{5}{6}-\frac{3}{2})}{\sqrt{2.25}(2\frac{3}{4}-1\frac{1}{3})}=\frac{(\frac{3}{4})^2(\frac{13}{6})(-\frac{5}{6})}{\sqrt{\frac{9}{4}(1\frac{5}{12})}}$

$$=\frac{\frac{9}{16}\times\frac{13}{6}\times-\frac{5}{6}}{\frac{3}{2}\times\frac{17}{12}}=-\frac{65}{64}\times\frac{24}{51}$$

$$=-\frac{65}{136} \quad Ans$$

Q. 2. (a) A and B contribute Rs. 500 and Rs. 600 and start a business. A retires five months later and then C joins B with a capital of Rs. 300 but retires after six months. At the end of the year what share of the profit of Rs. 230 should each of them get ?

(b) A man buys Rs. 1,764 stock at 98 and sells out when they have risen to par. What sum does he clear, brokerage being $\frac{1}{8}$ per cent in selling ?

Solution : (a) A contribute 500 5 in the year

B ,, 600×12 ,, ,,

C ,, 320×6 ,, ,,

∴ The ratio in which the profits are to be divided

$$=25 : 72 18$$

$\therefore$ A's share of Rs. 230 $= \dfrac{230 \times 25}{115} =$ Rs. 50

B's ,, ,, $= \dfrac{230 \times 72}{115} =$ Rs. 144

C's ,, ,, $= \dfrac{230 \times 18}{115} =$ Rs. 36

(b) The amount of stock $= \dfrac{100 \times 1764}{98} = 1800$

$\therefore$ The sale proceeds at par $= 99\frac{3}{4} \times \dfrac{1800}{100} = \dfrac{7191}{4}$

$= $ Rs 1797—12 Ans

Q 3. (a) If a sum of money amounts to Rs. 2,700-0-0 and to Rs 3,037-8-0 at the end of the first and second years respectively find the sum and rate of interest

(b) A person buys a house for Rs. 35,000 and rents it for Rs. 180 per month. He pays a municipal tax of Rs. 120, per half-year and spends Rs. 100 per year on white-washing and maintenance If 2 per cent of the cost of the house is allowed for depreciation, find his net income in the first year and calculate what rate of interest his investment yields.

Solution (a) Interest for 2nd year $= 3037\frac{1}{2} - 2700$

$\therefore$ Rate of interest $= 337\frac{1}{2} = \frac{2}{2}\frac{1}{5}$

$= \frac{2}{2}\frac{1}{5} \times \frac{100}{2700} = \frac{25}{2}$

$= 12\frac{1}{2}\%$

$\therefore$ The sum $= \dfrac{100 \times 2700 \times 2}{225} =$ Rs. 2400.

(b) Rent of 12 months $= 180 \times 12 = 2160$

Municipal tax for one year $= 120 \times 2 = 240$

Cost of annual repairs $= 100$

Depreciation cost $= \dfrac{35000 \times 2}{100} = 700$

$\therefore$ His net Income $= 2160 - (240 + 100 + 700)$

$= 1120$

Rate of interest $= \dfrac{1120 \times 100}{35000} = \frac{16}{5} = 3\frac{1}{5}\%$.

Q. 4. The following are the timings of a train running from Bangalore to Mysore :

Miles			
—	Bangalore City	Dep	7-55 a.m.
46	Maddur	{ Arr.	9-35
		{ Dep.	9-43
58	Mendy	{ Arr.	10-9
		{ Dep.	10-12
77	Srirangpatna	{ Arr.	10-55
		{ Dep.	10-59
86	Mysore	Arr.	11-35

Calculate the average running speed of the train.

It is proposed to speed up the train so as to get it to arrive at Mysore 25 minutes earlier without reducing the periods of halt at the intermediate stations. Find what should then be the average speed of the train. Prepare a time-table for the train which runs at this speed, starting at the same time.

Solution : Total running time $= 1\frac{2}{5}h + (26+43+36)$ mts.

$= 3\frac{5}{12}$ hours.

∴ Total journey $= 86$ miles

∴ Average running time $= 86 \times \frac{12}{41} = 25\frac{7}{41}$ m. p. h.

∴   „   „   speed when the speed is increased.

$= 28\frac{2}{3}$ m. p. h.

Arrival at Maddur	{ 9-31
Dep. from „	{ 9-39
Arrival at Mandva	{ 10-4
Dep from „	{ 10-7
Arrival at Surangpatna	{ 10-47
Departure from „	{ 10 51
Arrival at Mysore	11-10

Q. 5. (a) The cost of manufacture of an article consists of two parts—cost of raw materials and labour. Between 1949 and 1953 the cost of raw materials has increased by 25 per cent. and labour by 50 per cent If the cost of the article has risen by 30 percent, find the ratio of cost of ls to labour in 1949 and also the ratio in 1933.

(b) The area of a square field is 10 acre Calculate (ı) the length of its perimeter (ıı) the length of its diagonal correct to the nearest foot

Solution (a)

From the above it is clear that cost of material labour in 1949=20 5 or 4 1

The ratio between cost of material Labour in 1953 =5 1½ or 10 3

(b) Area of the square field =48400 sq yds

Side of the   =220 yds

Its perimeter   =880 yds

Length of the diagonal=$\sqrt{220\times2}$=311 yds nearly

Q. 6 For the year 1952-53 the rates of income tax on individual incomes are as follows :—

Taxable income is four fifths of total income

	Rate
On the first Rs 1 500 of taxable income	Nil
On the next Rs 3 500 of taxable income	Nine pies in the rupee
On the next Re 5 000 of taxable income	One anna and nine pies in the rupee
On the next Rs 5 000 of taxable income	Three annas in the rupee
The balance of taxable income	Four annas in the rupee

(a) Calculate the income tax paid by an individual whose total income is Rs 14 000

(b) Find the total income of a man who paid an income tax of Rs 199 1 0

Solution : (a) Taxable income $= 14000 \times \frac{4}{5} = 11200$

Income Tax on next 3500
after deducting 1500 } $= \frac{3500 \times 9}{192} = \frac{2625}{16}$

Do Do. next 5000 $= \frac{5000 \times 7}{64} = \frac{4375}{8}$

Do. Do remaining 1200 $= \frac{1200 \times 3}{16} = 225$

$\therefore$ Total Income Tax $= \frac{2625}{16} + \frac{4375}{8} + 225$

$= $ Rs. 935—15

(b) Income not taxable $= 1500$

Income Tax on next 3500 $= 164—1$

$\therefore$ Remaining Tax at $1\frac{1}{4}$ annas a rupee $= 199\frac{1}{16} - 164\frac{1}{16}$

$= $ Rs. 35

$\therefore$ Income on which 35 is income Tax $= \frac{1 \times 64 \times 35}{7}$

$= $ Rs. 320

$\therefore$ His total taxable income $= 1500 + 3500 + 320$

$= 5320$

$\therefore$ Total income $= 5320 \times \frac{5}{4} = 6650$

Part B

Take $\pi = \frac{22}{7}$, wherever π occurs in your calculations)

Q. 7. Three circles each of radius 2″ are drawn with centres at the vertices of an equilateral triangle of side 2″. Calculate (a) the area common to any two circles and (b) the area common to all the three circles. (Take $\sqrt{3} = 1.732$; give your answers to the nearest hundredth of a sq. in.)

Solution : From the figure it is ⋯ ⋯ the area common to two circles is equal to

$$= 2\left\{ \frac{2\pi r^2}{6} - \triangle \right\} = 2\left\{ 2 \times \frac{22}{7} \quad \frac{2^2}{6} \quad - \quad \right\}$$

$$= \{2 \times \frac{22}{7} \times 4 \times \frac{1}{2} - 2 \cdot 3\}$$

$$= 2\{\frac{22}{7} - 1.732\} - 2 \cdot 2.45 \quad \dots$$

area common to three circles

$$v = \frac{3r^2}{6} - 2\Delta = \frac{\sqrt{3}}{2} \times \frac{1}{2} \times 4 - 2 \times \frac{1}{2} \times 2\sqrt{3}$$

$$= \frac{4}{1} - 2 \times 1\ 732 = 2\ 821 \text{ sq inch}$$

Q 8 Water is pumped into an overhead tank of capacity 4,400 gallons at the rate of 76 gallons per minute Water flows out from the tank continuously without stoppage through a pipe of internal diameter 2 inches at a speed of 70 feet per minute The pump is an automatic electrical one which starts working when the tank becomes half empty and stops when it becomes full Calculate (a) the time for which the pump works after it starts, (b) the interval during which the pump does not work

Solution Half the capacity of the tank

$$= \frac{4400}{2} = 2200 \text{ gallons}$$

Emptying capacity per min

$$= \frac{70 \times 12 \times \frac{2}{3} \times 1\frac{1}{4}}{277 - 274} = 10 \text{ gallons nearly}$$

(a) Time taken to fill it $= \frac{2200}{66} = \frac{200}{3} = 67\frac{2}{3}$ mins

(b) Time during which the pump does not work

$$= \frac{2200}{10} = 220 \text{ mins} = 3\text{hrs} - 40 \text{ mins.}$$

Q 9 When a light sphere of diameter 4 cm is floated in water contained in a cylindrical jar of diameter 6 cm, the level of water rises by 1 cm Find what fraction of the volume of the sphere under water

Show that the highest point of the sphere is 1 cm above the water level and hence calculate the area of the surface of the sphere above water.

Solution Volume of the immersed part

$$= 1 \times \frac{3}{2}^2 \times 9 \text{ c c} = 1\frac{3}{2}^2$$

Total volume of the sphere $= \frac{4}{3} \times \frac{22}{7} \times 2^3 = \frac{74}{21}$ c.

∴ Fraction in water $= \frac{132}{74} \times \frac{21}{22} = \frac{18}{22}$.

Q. 10. The figure given below shows the section of a wall and its foundation. The wall is 30 feet long. Find the number of bricks required for constructing the wall, given that 128 bricks are required for 9 c. ft. of wall.

The dimensions of the figure are :—

Plenthis is $2' \times 22'\frac{1}{2}$

Wall is 6' by $18'' + \frac{1}{2}$ inch of plaster on both sides

Top of the wall is "6 by $22\frac{1}{2}'' + \frac{1}{2}$ inch of plaster on the sides and top.

If the wall has to be plastered both sides lengthwise and on the top, to a thickness of $\frac{1}{2}$ inch, as indicated by the shaded area in the figure, find the volume of plaster necessary.

Solution :

$$\text{Volume of the Plenthis} = \frac{45}{2} \times \frac{1}{12} \times 2 \times 30$$
$$= \frac{225}{2} \text{ c. ft.}$$

$$\text{Volume of the top} = \frac{45}{2} \times \frac{6}{12} \times 30 = \frac{675}{2} \text{ c. ft.}$$

$$\text{Volume of the wall} = \frac{18}{12} \times 6 \times 30 = 270 \text{ c. ft}$$

$$\therefore \text{ Total volume of the wall} = \frac{225}{2} + \frac{675}{2} - 270$$
$$= \frac{3285}{2} \text{ c. ft}$$

$$\therefore \text{ No. of bricks required} = \frac{3285}{9} \times 128 = 5840$$

$$\text{Area of the wall to be plastered} = (6 - 6) \times 30$$
$$= 360 \text{ sq. ft.}$$

$$\text{Area of the top to be plastered} = \frac{45}{2} \times \frac{1}{12} \times 30 = \frac{225}{4} \text{ sq. ft.}$$

$$\text{,, ,, sides of the top} = \frac{6-6}{12} \times 30 = 30 \text{ sq. ft.}$$

$$\text{,, ,, under surface of the extension of top}$$
$$= \frac{2}{2} \times \frac{1}{12} \times 30 = \frac{45}{2} \text{ sq. ft.}$$

$$\therefore \text{ Total area to be plastered}$$
$$= 360 - \frac{225}{4} - 30 - \frac{45}{2} = \frac{1875}{4} \text{ sq. ft.}$$

$$\therefore \text{ Volume of the plaster} = \frac{1875}{4} \times \frac{1}{24} = \frac{625}{6} = 78\frac{1}{2} \text{ c. ft.}$$

————

Military Wing July 1953

MATHEMATICS PAPER II

Time allowed 2 hrs.   *Max. Marks 150*

Candidates should attempt 8 questions at least one from Part

Part A

1. (a) If the sum of the two roots of a quadratic equation be 1 and their product be also 1, calculate the values of the two roots.

(b) Simplify —

$$\left(\frac{x^m}{x^n}\right)^{m+n} \times \left(\frac{x^n}{x^l}\right)^{n+l} \times \left(\frac{x^l}{x^m}\right)^{l+m}.$$

(c) Factorise —

$$12x^3 + 4x^2 - 3x - 1.$$

Sol. (a) Suppose the two roots are .—a and b.

Then $\qquad a + b = 1 \qquad \qquad ...(i)$

and $\qquad ab = 1 \qquad \qquad ...(ii)$

$\qquad (a+b)^2 - 4ab = 1^2 - 4 = -3$

$\qquad (a - b)^2 = -\sqrt{3} \qquad ...(iii)$

$\therefore$ Adding (i) and (iii) $= 2a = 1 - \sqrt{3}$ or $a = \dfrac{1 - \sqrt{3}}{2}$

Subtracting (iii) from (i) $b = \dfrac{1 + \sqrt{3}}{2}$

(b) Exp. $= (x^{m-n})^{m+n} \times (x^{n-l})^{n+l} \times (x^{l-m})^{l+m}$

$\qquad = x^{m^2 - n^2} \times x^{n^2 - l^2} \times x^{l^2 - m^2}$

$\qquad = x^{m^2 - n^2 + n^2 - l^2 + l^2 - m^2}$

$\qquad = x^0 = 1.$ Ans.

(c) Exp. $= 12x^3 - 3x + 4x^2 - 1 = 3x(4x^2 - 1) + 4x^2 - 1$

$\qquad = (4x^2 - 1)(3x + 1) = (2x + 1)(2x - 1)(3x + 1).$

2. (a) (i) If

$$\frac{a}{x} = \frac{b}{y} = \frac{c}{z}$$

then show that

$$\frac{ma^2 + nb^2}{mx^2 + ny^2} = \frac{mb^2 + nc^2}{my^2 + nz^2},$$

where m and n are any arbitrary quantities.

(ii) If $\quad \dfrac{x}{b+c} = \dfrac{y}{c+a} = \dfrac{z}{a+b}$,

then show that

$$\frac{a}{y+z-x} = \frac{b}{z+x-y} = \frac{c}{x+y-z}.$$

(b) If $\quad bc + ca + ab = 0,$

show that

$$\frac{1}{a^2 - bc} + \frac{1}{b^2 - ca} + \frac{1}{c^2 - ab} = 0.$$

Then $\quad x = ak, \; y = bk, \; c = ck.$

Sol. (a) (i) Let $\dfrac{a}{x} = \dfrac{b}{y} = \dfrac{c}{z}$ be $= \dfrac{1}{k}$

$\therefore \quad \dfrac{ma^2 + nb^2}{mx^2 + ny^2} = \dfrac{ma^2 + nb^2}{ma^2 k^2 + nb^2 k^2} = \dfrac{1}{k^2}$

$\dfrac{mb^2 + nc^2}{my^2 + nz^2} = \dfrac{mb^2 + nc^2}{mb^2 k^2 + nc^2 k^2} = \dfrac{1}{k^2}$

$\therefore \quad \dfrac{ma^2 + nb^2}{mx^2 + ny^2} = \dfrac{mb^2 + nc^2}{my^2 + nz^2}.$

(ii) Let $\dfrac{x}{b+c} = \dfrac{y}{c+a} = \dfrac{z}{a+b}$ be $= \dfrac{k}{1}$

$\therefore \quad x = k(b+c) \; ; \; y = k(c+a) \; ; \; z = k(a+b)$

Then $\dfrac{a}{y+z-x} = \dfrac{a}{k(c+a)+k(a+b)-k(b+c)}$

$$= \frac{a}{2ka} = \frac{1}{2k}$$

$\dfrac{b}{z+x-y} = \dfrac{b}{k(a+b)+k(b+c)+k(c+a)}$

$$= \frac{b}{2kb} = \frac{1}{2k}$$

$$\frac{c}{x+y-z} = \frac{c}{k(b+c)+k(c+a)-k(a+b)}$$

$$= \frac{c}{2kc} = \frac{1}{2k}$$

$$\therefore \quad \frac{a}{y+z-x} = \frac{b}{z+x-y} = \frac{c}{x+y-z}$$

(b) $ab+bc+ca=0$

$$bc = -a(b+c), \; ca = -b(c+a) \text{ and } ab = -c(a+b)$$

$\therefore$ Substituting these values of bc, ca, and ab

we get $\text{Exp} = \dfrac{1}{a.a+b+c} + \dfrac{1}{b(a+b+c)} + \dfrac{1}{c(a+b+c)}$

$$= \frac{bc+ca+ab}{abc(a+b+c)} = \frac{0}{abc(a+b+c)} = 0.$$

3. (a) The sum of the ages of a brother and a sister is
one-fifth of the squares of their ages. The difference in
their ages is twice the age of the younger of the two. Find
their ages.

(b) Solve :—

$$2x^2 + 2\sqrt{(2x^2-x-2)} = x+1.$$

Sol (a) Suppose the ages of the brother and the sister
are $=x$ and y respectively.

Then

$$x+y = \tfrac{1}{5}(x^2+y^2) \qquad \ldots(i)$$

$$x-y = 2y \text{ or } x=3y \qquad \ldots(ii)$$

Substituting this value of x in (i) $=3y+y=\tfrac{1}{5}(9y^2+y^2)$.

or $4y=2y^2$

$$y=2 \text{ and } x=6$$

(b) $=2\sqrt{2x^2-x-2} = -2x^2+x+1$

Squaring $=4(2x^2-x-2) = 4x^4+x^2+1-4x^3-4x^2+2x$

$$=8x^2-4x-8 = 4x^4-4x^3-3x^2+2x+1$$

or $=4x^4-4x^3-11x^2+5x+9$

Taking the square root of

or $2x^2 - x - 3 = 0$

or $(x+1)(2x-3) = 0$

$\therefore$ $x = -1$ or $2x = 3$ where $x = \frac{3}{2}$.

4. (a) By the application of the Remainder Theorem find the value of a so that

$$2x^4 + 3x^3 - 7x^2 - 5x - 31 + a$$

may be exactly divisible by $x + 3$.

(b) Draw the graphs of the curves

$$4y = x^2$$

and $$2y = x + \frac{3}{2}$$

from $x = -2$ to $x = 4$ and give the abscissae of their points of intersection.

Sol. (a) In order that the exp. may be diviable by $x+3$ the expression should vanish by substituting $x = -3$.

Exp. $= 2(-3)^4 + 3.(-3)^3 - 7.(-3)^2 - 5 \times -3 - 31 + a = 0$

or $162 - 81 - 63 + 15 - 31 + a = 0$

or $2 + a = 0$ $\therefore$ $a = -2$. *Ans.*

(b) Draw the graph yourself

Part B

5. Draw a circle of 6 cm. diameter and construct an equilateral triangle inside it so that the vertices lie on the circle.

Draw the perpendicular from any vertex to the opposite side and measure the height.

Construct an equal equilateral triangle separately and then construct a square of area equal to that of the triangle.

(The set square and the protractor are not to be used and all geometrical steps of various constructions are to be retained.

6. If ABC be a right-angled triangle with right angle at A and if AD be the perpendicular on BC, prove that the

r angles ABD and ACD are similar to each other and also to the triangle ABC

If AC be twice AB prove that the area of the triangle ACD would be four times the area of the triangle ABD

7 Define a parallelogram

Show that if any pair of opposite sides of a quadrilateral are equal and parallel then it forms a parallelogram

8 Prove that the angle which an arc of a circle subtends at the centre is double that which it subtends at any point on the remaining part of the circumference

If PQ be a fixed chord of a circle and L any point on one of the arcs cut off by it then show that the bisector of the angle PLQ meets the conjugate arc in the same point for all positions of L

Part C

9 (a) (i) Show that

$$\sin^2 x + \cos^2 x = 1$$

(ii) Given $\tan A = \frac{5}{12}$, angle less than a right angle find $\sin A$ and $\cos A$ Also how that

$$\operatorname{cosec} A - \cot A = \frac{1}{5}$$

(b) If θ be a positive obtuse angle then for what value of θ is the equation

$$2 \tan \theta + \frac{1}{\cos^2 \theta} = 0$$

satisfied ?

Sol (a) (i) Let the revolving line starting from the initial position OX Trace out an angle A. From P any point in the final position of the revolving line draw PM perpendicular to OX Then from the rt angled △OPM we get

$$MP^2 + OM^2 = OM^2$$

$$\frac{MP^2}{OP^2} + \frac{OM^2}{OP^2} = \frac{OM^2}{OP^2} = 1$$

$$\sin^2 \lambda + \cos^2 \lambda = 1$$

$$\frac{\sin A}{\cos A} = \tan A = \frac{5}{12}$$

$$\sin A = \frac{5}{13}, \ \cos A = \frac{12}{13}$$

$$\operatorname{cosec} A - \cos A = \frac{13}{5} - \frac{12}{13} = \frac{1}{5}$$

(b)
$$2 \tan \theta + \frac{1}{\cos^2\theta} = 0$$

$$2 \tan \theta + \sec^2\theta = 0$$

$$2 \tan \theta + 1 + \tan^2\theta = 0$$

or
$$(1 + \tan \theta)^2 = 0$$

$$\therefore \quad \tan \theta = -1$$

$$\therefore \quad \theta = 135°.$$

10. (a) (i) Find any three angles whose sine is equal to $\frac{\sqrt{3}}{2}$.

(ii) If a triangle be such that the sine of one of the angles is equal to the cosine of another angle, both being equal to $\frac{1}{2}$, then find all the angles of the triangle.

(b) A person standing on the bank of a river observes the angle of elevation of a tree just in front, on the opposite bank, to be 60°. Going backwards a distance D he finds the elevation to be 30°. Find the height of the tree.

Sol. (a) (i) $\sin 60° = \sin(180 - 60) = \sin(2\pi + 60) = \frac{\sqrt{3}}{2}$.

(ii) $\sin A = \cos B = \frac{1}{2}$.

$\therefore \quad A = 30° \quad B = 60° \quad \therefore \quad C = 90°.$

(b) Let the top of the three be the point P. Draw PN perpendiclar to the ground. Let the first position of the man be M_1 and second M_2.

Let the height be h.

Then
$$\frac{h}{NM} = \tan 60°$$

$$\frac{h}{NM_1} = \tan 30°.$$

$$NM_1 = h \cot 60°$$

$$NM' = h \cot 30°$$

$$NM' - NM = h(\cot 30° - \cot 60°)$$

$$D = h \left(\sqrt{3} - \frac{2}{\sqrt{3}} \right) = \frac{h}{\sqrt{3}}$$

$$h = \sqrt{3} \, D.$$

January, 1954

ENGLISH

Time allowed—$2\frac{1}{2}$ *hours*   *Maximum Marks—300*

Q 1   Write an essay of about 400 words on one of the following subjects :—

(a) Suppose you are condemned to live on a desert island and allowed to take only three books What three books would you choose and why ?

(b) The most exciting cricket or football match you have seen

(c) A modern railway station

(d) The place of the radio in modern life

(e) Methods of teaching traffic and safety first rules   120

Ans   Prime Minister's XI V/S S J O C Team

Match had been organised in aid of Prime Minister's Charity Relief Fund for three days   The S J U C team had declared their second innings at the overnight total of 157 for four wickets

P Roy and Benu Das Gupta of the Prime Ministers XI opened their second innings   Ben Barnett the skipper of S J O C team put Loader and Loxton to the attack from the High Court and Maidan ends respectively

Roy opened his account pushing Loader to square leg for two runs Das Gupta took a single off the last ball of Loxton's first over

The first bowling change came at 33   C J Barnett taking over from Loader at the High Court end   Marshall came in place of Loxton a run later and started with a maiden over

Das Gupta sent the score to 50 in one hour and six minutes cutting the fourth ball of Marshall's fourth over for a sharp single.

Jack Iverson took over from Marshall at 54 and bowling round wicket to Roy dismissed him in the fourth ball of his first over at the same total (54-1-27).

Roy stepped back to play Iverson's leg-break and was clean bowled. He was at the crease for one hour 12 minutes and had hit one four in his 27.

Mushtaq Ali joined Benu Das Gupta to face the last ball of Iverson which kept low. Mushtaq blocked confidently to concede a maiden.

Das Gupta, who was out to an under-hand delivery from Iverson in the first innings, blocked two of his deliveries and took a single with an extra cover drive from the third ball.

Mushtaq's coming in speeded up the rate of scoring. He pulled the fifth ball of Iverson's over on his knees to the fence to open his account.

Das Gupta fell leg-before to Barnett in the last ball of his eighth over getting his 25 runs in one hour and 32 minutes.

Mankad then joined Mushtaq Ali. Mushtaq on-drove Iversons's first ball of the fifth over to mid-on fence to reach his individual 25. Mankad was still to open his account, the overall total being 93.

The score reached 100 from four leg byes off C. J. Barnett in 97 minutes. From his 31, Mushtaq took ten singles to reach 41 in 40 minutes' stay.

Mankad was then batting with 17. He was feeling uneasy against Barnett, but he got over the difficulty and on drove him to mid-on for 6. Lunch came with 134 for two wickets on board (Mushtaq 45, Mankad 17. Extras 20).

Iverson opened to Mankad from the Maidan end after lunch. Watkins bowled from the other end and at 139, Mushtaq by then had advanced by two or three runs. He took a short single off Iverson's second ball of the second over after lunch to reach his 50 in 53 minutes with five fours to his credit. This took the total to 145

The hours and 14 minutes play sent 150 on board with Mankad taking a cheeky single off Watkins to reach his individual 25

Mankad looked impatient for runs and swept Iverson to mid wicket when he was 34 but Subba Row failed to hold a difficult catch

The Mushtaq Ali-Vinoo Mankad partnership ended at 172 when the former was adjudged leg before to a low ball from Watkins which Mushtaq tried to push off his pads

He played 75 minutes for his 60 which included five fours This wicket added 85 runs in 50 minutes (172 3-60)

Kenny joined Mankad With Mankad batting 9 and at his individual 16 Kenny on drove Iverson for three to take the score to 202 in two hours and 50 minutes Immediately afterwards Mankad late cut Iverson to reach his 50 in 6 minutes stay with five fours as his principal strokes

Loader came in place of Watkins from the High Court end at 205 and summoned the new ball in his third delivery to Mankad the batsman took a single Loxton took over the attack from Iverson at the Maiden end but Mankad drove him to cover and extra cover for two and three runs respectively in his first two deliveries This sent the score to 211

Kenny drove Loxton to extra cover for three runs to reach his individual 22 in a total of 214

Mankad was back 11 the pavilion a run after when 58 He tried to cut a rising ball in Loader in the first slip un touched it to Ben Barnett who in an effort to hold it, dropped But Umpire Surti called out Mankad waited for the umpire s decision Apparently unsatisfied with it He batted for 92 minutes (215 4-58)

Ramchand was associated with Kenny fore the fifth wicket

Kenny was very steady and when 34 he took three consecutive fours from Loader with two hooks and a cover-drive He reached his 46 in a total of 245 Loader conceded 14 run in his fourth over after lunch

At 265, Iverson came to bowl in place of Loxton ? Watkins relieved Barnett five runs later

Kenny and Ramchand flogged the bowling after tea break when the P.M.'s XI was requiring 75 runs for a win.

Iverson opened from the Maidan end to Kenny and Watkins took charge of the attack at the other end. the score was 299. Kenny hit Watkins for three within five minutes of the resumption to take the total to 302. This was achieved in four hours and five minutes.

Ramchand reached his individual 50, taking 14 runs off Watkin's bowling with two lusty hits to the leg, and one off-drive. His 50 came after 68 minutes' stay at the crease.

In his next over, Kenny, in trying to hit another ball outside the off stump, touched it to Ben Barnett and was out without any addition to his scors. Kenny played for 117 minutes with 11 fours as his princiapl strokes. Ramchand and Kenny put on 139 runs for the fifth wicket (354-5-92).

Frank, who joined Ramchand, was soon bowled by Watkins at 361 before he could open his account. Ramchad was then 71 (361-6-0).

With only eight runs to win Amarnath, the skipper, filled in the gap.

Ramchand, with a wild sweep took three runs off Marshall and Amarnath opened his account with a two off the same bowler. Amarnath added another two runs to wipe out the deficit.

Watkins came to bowl the last over of the day from the High Court end. Ramchand failed to connect his first ball. but pushed it powerfully to the fence passing the S100 team's total and taking the score to 372, thus giving the P.M.'s XI a four-wicket victory. Ramchand remained unbeaten with 78, obtained in 103 minutes with 11 fours, 12 minutes before close.

Three Books that I'll Choose

Outlines :

I will give a due thought to it and then make a selection out of the ood authors that I like best. For ins.ance, "Meet Mr. Mulliner" by P. G. Wodehouse, is one of his

lappiest creation. It is his masterpiece. It will keep up my spirits and will not dull my sunny view of life

Another book that I will select will be poems by Keats, who is so youthful that he died on the threshold of manhood Keats enjoyed the 'luxury' of life and felt its pain exactly like so many millions of youngmen and women Because he is the poet of frank sensuous perception, of taste and smell and touch He is also the poet of 'sensations' of coolness, quietude and calmness

The third book would be one of the classics which have influenced the life of millions of Hindu boys and girls by the stories related during my boyhood by the cradle-side Either 'Ramayana' or the 'Mahabharata' How many times since then I have dreamt to emulate the heroes in 'Ramayana' One of these books I will have for it will keep up my spirit whenever despondency overwhelms me

THE PLACE OF RADIO IN MODERN LIFE

Radio is one of the wonders of modern science. Experiments in wireless transmission of messages began towards the end of the nineteenth century The name of Marconi is specially associated with the invention of the wireless

It is a noted fact and a wonderful one too, that sitting at Delhi thousands of miles away if you are listening to the radio, you can hear the strokes of the clock on the London clock tower sooner than those people who are standing in London at the foot of the clock tower The speed at which the radio message is flashed across is calculated to be 18000 miles per second

Radio is the most powerful means of Communication in the hands of man and, like other things it can be used for good or bad purpose It can be used to direct a flying fleet of aeroplanes in the same way as a small number of soldiers can be commanded by an officer personally It can be made the agency of death and destruction On the other hand it can equally well be used to save ships on the wide ocean which are on the point of being wrecked by hasty communications and quick arrangements for relief It can equally

well he used to rescue an aeroplane stranded in the wilderness of the great Sahara, a pilot who may have crashed and come down in the wilderness, hundred of miles away from the neighbourhood of man but who only posses the slender equipment of a radio, by which he can send out messages and be in perfect communication with the far-flung world. So on ——

MODERN RAILWAY STATION

A railway station is a place where a train stops to drop and let the passengers board it. It is mainly divided into three parts—(1) a booking office, the station master's office equipped with up-to-date modern apparatus specially the telephone system and the apparatus to show the position of the incoming or out-going trains, and the luggage office.

People flock to the station to catch their respective trains, usually long before the time as all of them do not posses a watch. The scene at the station before the arrival of the train is full of hustle and bustle of life and noise of passengers running hither and thither and hawkers. The crowd at the booking office window is appalling—young and old all in their anxiety to reach the window first elbow and push those in front of them. The noise and bustle increases as the time for the train draws near.

The platform is crowded and sea of heads waving to and fro is found there. People of all nationalities and ages meet here. Hawkers are seen selling their commodity and shouting at the top of their voices. The coolies carrying their loads followed by passenger at their heels are seen running through the crowded platform etc. etc.

Q. 2 Make a precis of the following passage in about 120 words. Give a short title to your precis. The precis should be written on the special precis sheet provided.

Few virtues have been more praised by moralists than generosity; every book on morality aims at increasing our sensibility of the distresses of others so that we may be generous. Philosophers that are do not praise it because they are gainers by its effects, and say Seneca himself

ten a treatise on benefits, though he was known to
othing away to others

it among many who have enforced the duty of confer-
'nefits, I am surprised there are none to teach the
ace of receiving them It is never shown that, by
y favour we accept, we in some measure lose our native
dom and that a state of continual dependence on the
nerosity of other is a life of gradual degradation

Every favour a man receives sinks him in some measure
below his dignity, and in proportion to the value of the
benefit or the frequency of its acceptance he gives up so
much of his natural independence He therefore, who
thrives on the unmerited generosity of another, suffers the
worst form of servitude if he has any self respect The
shackled slave may murmur without being reproached, but
the humble dependent is treated with ingratitude whenever
he shows any sign of discontent To increase his distress,
every new obligation only adds to the former load which kept
his vigorous mind from rising to independence

This is the case with sensitive minds But there are
some who born without any share of self respect or sensibil-
ity receive favour after favour and still cringe for more.
They accept the generous gifts of others with as little
reluctance as the wages of merit and even make thanks for
past benefits to serve as an indirect petition for new Such, I
grant, can suffer no degradation from dependence, since
they were originally as vile as was possible to be Dependence
degrades only the innocent and artless, but leaves the base
mind in its original meanness In this manner, therefore,
long continued generosity is misplaced, or it as injurious,
if it is shown to a man who is worthless or makes a man
worthless, and true it is that the person who is contented to
be often obliged ought not to have been obliged at all
(About 370 words) 8)

Ans. MISPLACED GENEROSITY LEADS TO SERVI
TUDE

Generosity is highly eulogised as a mark of morality
Poor philosophers praise it because they are the gainers and
the rich because they can conceal their greed